Factoring Trinomials

In order to factor a trinomial, we must make **FOUR** terms so we can factor by grouping.

We do this by re-writing the middle term as a sum or difference of two terms.

Factoring a trinomial of the form:

\[ax^2 + bx + c\]

**Step 1:** Find the factors of \(a \cdot c\) that sum to \(b\)

**Step 2:** Break up the middle term as a sum (or difference) of the factors.

**Step 3:** Factor by grouping.

**Example 1:**

Factor:

\[4x^2 - 5x - 6\]

\[a = \underline{\phantom{0}}\]

\[b = \underline{\phantom{0}}\]

\[c = \underline{\phantom{0}}\]

\[a \cdot c = -24\]

We want to find factors of \(-24\) that sum to \(\underline{\phantom{0}}\).

To find these factors, we make a list:
Now that we have identified the factors, we can rewrite the trinomial by breaking up the middle term.

\[ 4x^2 - 5x - 6 \]
\[ 4x^2 + 3x + 8x - 6 \]

And now that we have four terms, we can factor by grouping.

\[ \frac{4x^2 + 3x + 8x - 6}{4x^2 + 3x} + 8x - 6 \]
Example 2:

Factor each trinomial.

a.) \(4x^2 - 2x - 6\)

b.) \(10a^2 + 9a + 2\)

c.) \(4w^2 + 8w + 3\)

d.) \(5x^2 - 16x + 3\)
Factoring Trinomials

Practice Problems

Factor each trinomial:

1. \(3x^2 + 10x + 7\)

2. \(12a^2 + 11a - 5\)

3. \(10w^2 - 11w - 6\)

4. \(6x^2 - 17x + 12\)

5. \(10c^2 - 23c + 12\)